

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

RESIDUE MANAGEMENT, MULCH TILL

(Acre)

CODE 329B

DEFINITION

Managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round, while growing crops where the entire field surface is tilled prior to planting.

PURPOSES

This practice may be applied as part of a conservation system to support one or more of the following:

- Reduce sheet and rill erosion.
- Reduce wind erosion.
- Maintain or improve soil organic matter content and tilth.
- Conserve soil moisture.
- Manage snow to increase plant available moisture.
- Provide food and escape cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all cropland.

This standard includes tillage methods, commonly referred to as mulch tillage, or chiseling and disking. It applies to stubble mulching on summer fallow land, to tillage for annually planted crops, and to tillage for planting perennial crops.

This standard does not apply to tillage systems using implements that fully incorporate the residue below the soil surface during any period of the year.

This practice does not apply to fields using seasonal residue management since the residues are not fully incorporated by mulch till for seedbed preparation.

CRITERIA

General Criteria Applicable to All Purposes Named Above

Loose residue to be retained on the field shall be uniformly distributed on the soil surface. Combines shall be equipped with spreaders capable of redistributing residue over at least 80 percent of the working width of the header.

Residue shall not be burned.

Tillage implements shall be equipped to operate through plant residues without clogging, and to maintain residue on or near the soil surface by undercutting or mixing.

Planters, drills, or air seeders shall be equipped to plant in residue distributed on the soil surface or mixed in the tillage layer.

The number, sequence, and timing of tillage and planting operations, and the selection of ground-engaging components, shall be managed to achieve the planned amount, distribution, and orientation of residue after planting or at other essential time periods. Acceptable alternative tillage sequences shall be initially determined by a residue budget using locally applicable data on residue production by crops and residue reduction by tillage machines. Further adjustments shall be made as needed during the tillage sequence based on field measurements of remaining residue.

Additional Criteria to Reduce Sheet and Rill Erosion

The amount of residue needed to reduce erosion within the soil loss tolerance (T) or any other planned soil loss objective, shall be determined using current approved erosion prediction technology. Partial removal of residue by means such as baling or grazing shall be limited to retain the amount needed. Calculations shall account for the effects of other practices in the conservation management system.

Tillage operations shall be limited to methods that leave residue on the soil surface and maintain the planned cover conditions throughout the year.

Additional Criteria to Reduce Wind Erosion

The amount and orientation of residue needed to reduce erosion within the soil loss tolerance (T) or other planned soil loss objective shall be determined using current approved wind erosion prediction technology. Partial removal of residue by means such as baling or grazing shall be limited to retain the amount needed. Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria to Maintain or Enhance Soil Organic Matter Content

The amount of residue needed to achieve the desired soil condition shall be determined on a field by field basis. The crop rotation will consist of at least 50 percent of the crops and will be non-fragile, high-residue producing crops. Partial removal of crop residue by means such as baling or grazing shall be limited to those crops designated as non-fragile residue as listed in the Kansas Field Office Technical Guide, Section I – General Resources References, Part 1 – Water Erosion, Table C-5, Residue Types (page 12). No more than 50 percent of total residue remaining after harvest of the crop will be removed. Organic matter content or trends will be determined using currently approved technology.

Additional Criteria to Conserve Soil Moisture

A minimum quantity of 50 percent residue cover shall be maintained throughout the year.

Residue shall be evenly distributed and maintained on the soil surface. Partial removal of residue by means such as baling or grazing shall be limited to retain the amount needed.

Additional Criteria to Manage Snow to Increase Plant Available Moisture

Stubble shall be left standing as high as possible by the harvesting operation, but not less than 6 inches in any case.

Stubble shall be maintained in a standing orientation over winter to trap and retain snow. Loose residue may be removed providing that the remaining residue is left standing. Fall tillage operations shall be limited to undercutting tools such as blades, sweeps, or deep tillage implements such as rippers or subsoilers, in order to maintain stubble in a standing condition through the months when snow occurs.

Additional Criteria to Provide Food and Escape Cover for Wildlife

The amount of residue and height of stubble needed to provide cover shall be determined using an approved habitat evaluation procedure. Residues shall not be removed unless it is determined by the habitat evaluation procedure that removal would not adversely affect habitat values. Stubble shall be maintained standing over winter. Tillage shall be delayed until spring, in order to maintain waste grain on the soil surface during winter.

Where migratory waterfowl and/or sandhill cranes are the species of concern, residue shall be present during both the spring and fall migration.

CONSIDERATIONS

Excess removal of plant residue by such means as baling or grazing often produces negative impacts on resources. These activities should not be performed without full evaluation of impacts on soil, water, animals, plants, and air.

Typically, mulch tillage utilizes chisels, disks, sweeps, field cultivators, rod weeders, and harrows. Generally more than half the soil surface is disturbed by tillage prior to planting.

Mulch till may be practiced continuously throughout the crop sequence, or may be managed as part of a residue management system that includes other tillage methods such as no till.

Minimizing tillage reduces the rate of decomposition of new crop residue and residual soil organic matter content allowing for the conservation or enhancement of soil organic matter content. Increased soil organic matter leads to improved soil structure, reduced crusting, increase infiltration and water holding capacity, and reduced nutrient leaching potential. The improved environment for soil biological activity may result in more efficient nutrient cycling and lower pesticide loss potential.

Production of adequate amounts of crop residue necessary for the proper functioning of this practice can be enhanced by selection of high residue producing crops and crop varieties in the rotation, use of cover crops, and adjustment of plant populations and row spacing.

Where improvement of soil tilth is a concern, use of undercutting tools will enhance accumulation of organic material in the surface layer.

The effectiveness of stubble to trap snow increases with stubble height. Variable height stubble patterns may be created to further increase snow storage.

Leaving rows of unharvested crop standing at intervals across the field can enhance the value of residues for wildlife habitat.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

If row cultivation or tillage for weed escapes, leveling ruts, fracture of hard pans, or similar operations become necessary, it should be limited to deep ripping or shallow non-inversion tillage tools which minimize burial of surface residue. Leveling ruts and fracturing hard pans are best preformed during dry periods.